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FINAL TECHNICAL REPORT

"STUDIES OF THE EVOLUTION OF THE X-RAY EMISSION
OF CLUSTERS OF GALAXIES"

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We have conducted two projects supported by the above grant. Both involve constraining the mass fluctuation spectrum using X-ray measurements of clusters of galaxies.

In the first project we present a statistically complete sample of galaxy clusters which also has complete X-ray temperature information. Using this sample we derive the cluster temperature function. This function constrains the shape and amplitude of the mass fluctuation power spectrum. For a power law form, we find that the power law index is $-(1.7 \pm 0.6/-0.3)$ and the amplitude implies that the rms value of the mass fluctuations is 0.59 ± 0.02 on scales of 8 Mpc ($H_0 = 50$) at the present epoch.

In the second project, we have extracted a sample of clusters from the Einstein Medium Sensitivity Survey (EMSS). This sample is flux limited and is 98.4% identified. It contains 93 X-ray selected clusters out to a redshift of 0.58. Using this sample, we obtain the cluster X-ray luminosity function at three cosmic epochs. While our luminosity function agrees with previous determinations at the lowest redshift, we find that the volume density of high luminosity clusters is greater now than it was in the past. The normalization, shape, and time dependence of the luminosity function can be described by a simple hierarchical formation model with the same parameters which also describe the above temperature function. In this model the comoving hot gas density remains constant with time at least to redshifts of order 0.35.

These results are described in two papers submitted to the Astrophysically Journal.